

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:  
Larry D. Kinsman

Application No.: Not Yet Assigned

Group Art Unit: 2822

Filed: Concurrently Herewith

Examiner: Not Yet Assigned

For: LOW PROFILE BALL GRID ARRAY  
PACKAGE

**FIRST PRELIMINARY AMENDMENT**

**Box Non-Fee Amendment**  
Commissioner for Patents  
Washington, DC 20231

Dear Sir:

Prior to examination on the merits, please amend the above-identified U.S. patent application as follows:

**In the Specification:**

Page 1, line 2, before "Field of the Invention", insert --This application is a divisional application of U.S. patent application Ser. No. 09/632,087 filed August 2, 2000, which is a divisional application of U.S. patent application Ser. No. 09/028,646 filed February 24, 1998, U.S. Patent No. 6,172,419, the entirety of which are incorporated herein by reference.--

Please replace the paragraph beginning on page 1, line 23, and ending on page 2, line 12, with the following new paragraph:

Ball grid array semiconductor packages are well known in the electronics industry. Currently available prior types include the Plastic Ball Grid Array (PBGA), the Ceramic Ball Grid Array (CBGA), and the Tape Ball Grid Array (TBGA). A BGA package typically comprises a substrate, such as a printed circuit board, with a series of metal traces on the top side. This series of metal traces is connected to a second series of metal traces on the bottom side of the substrate through a series of wire channels located around the periphery of the substrate. A semiconductor die, having a plurality of bond pads, each associated with an input or output of the semiconductor die, is mounted to the top side of the substrate. The bond pads are connected to the series of metal traces on the top side of the substrate by wire bonds. Typically, the semiconductor die and wire bonds are encapsulated with a molding compound. The second series of metal traces located on the bottom side of the substrate each terminate with a contact pad where a conductive solder ball is attached. The conductive solder balls are arranged in an array pattern, and are connected to the next level assembly or a printed wiring board in the final application.

Please replace the paragraph beginning on page 9, line 28, and ending on page 10, line 14, with the following new paragraph:

Substrate 102 has an opening or aperture 114, extending from the top surface of substrate 102 to the bottom surface of substrate 102. An upward facing cavity is formed by securing a support base such as thin sheet material 116 to the bottom of substrate 102 to cover aperture 114. Thin sheet material 116 is typically any type of polyimide or metal foil based or backed material, such as copper or aluminum, on the order of approximately

0.025 to 0.1 mm thick and preferably 0.05 mm thick, and must be able to withstand temperatures involved in typical solder reflow processes without degradation. An adhesive may be used to secure the thin sheet material 116 to substrate 102. The adhesive could be a thermoplastic, thermoset, or pressure sensitive type. The dimensions (length and width) of the thin sheet material 116 are greater than the dimensions (length and width) of aperture 114 so as to completely cover aperture 114, but typically less than the dimensions (length and width) of substrate 102.

P U R E P R O T E C T I O N

Please replace the paragraph beginning on page 11, line 24, and ending on page 12, line 9, with the following new paragraph:

Substrate 202 has an opening or aperture 214 extending from the top surface of substrate 202 to the bottom surface of substrate 202. A downward facing cavity is formed by securing a support material such as thin sheet material 216 to the top surface of substrate 202 to cover aperture 214. Thin sheet material 216 is typically any type of polyimide or metal foil based or backed material, such as copper or aluminum, on the order of approximately 0.025 to 0.1 mm thick and preferably 0.05 mm thick, and must be able to withstand temperatures involved in typical solder reflow processes without degradation. An adhesive may be used to secure the thin sheet material 216 to substrate 202. The adhesive could be a thermoplastic, thermoset, or pressure sensitive type. The dimensions (length and width) of the thin sheet material 216 are greater than the dimensions (length and width) of aperture 214 so as to completely cover aperture 214, but typically less than the dimensions (length and width) of substrate 202.

**In the Claims:**

Please cancel claims 1-38.

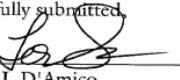
REMARKS

Claims 1-38 have been cancelled. Applicant reserves the right to pursue the original claims in this application and in other applications. The specification has been amended to correct typographical errors. No new matter has been introduced. Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made." Claims 39-44 are pending in this application.

Each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Dated: August 29, 2001

Respectfully submitted,

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**Version With Markings to Show Changes Made**

Paragraph beginning on page 1, line 23, and ending on page 2, line 12:

Ball grid array semiconductor packages are well known in the electronics industry.

Currently available prior types include the Plastic Ball Grid Array (P[G]BGA), the Ceramic Ball Grid Array (CBGA), and the Tape Ball Grid Array (TBGA). A BGA package typically comprises a substrate, such as a printed circuit board, with a series of metal traces on the top side. This series of metal traces is connected to a second series of metal traces on the bottom side of the substrate through a series of wire channels located around the periphery of the substrate. A semiconductor die, having a plurality of bond pads, each associated with an input or output of the semiconductor die, is mounted to the top side of the substrate. The bond pads are connected to the series of metal traces on the top side of the substrate by wire bonds. Typically, the semiconductor die and wire bonds are encapsulated with a molding compound. The second series of metal traces located on the bottom side of the substrate each terminate with a contact pad where a conductive solder ball is attached. The conductive solder balls are arranged in an array pattern, and are connected to the next level assembly or a printed wiring board in the final application.

Paragraph beginning on page 9, line 28, and ending on page 10, line 14:

Substrate 102 has an opening or aperture 114, extending from the top surface of substrate 102 to the bottom surface of substrate 102. An upward facing cavity is formed by securing a support base such as thin sheet material 116 to the bottom of substrate 102 to

cover aperture 114. Thin sheet material 116 is typically any type of polyimide or metal foil based or backed material, such as copper or aluminum, on the order of approximately 0.025 to 0.[0]1 mm thick and preferably 0.05 mm thick, and must be able to withstand temperatures involved in typical solder reflow processes without degradation. An adhesive may be used to secure the thin sheet material 116 to substrate 102. The adhesive could be a thermoplastic, thermoset, or pressure sensitive type. The dimensions (length and width) of the thin sheet material 116 are greater than the dimensions (length and width) of aperture 114 so as to completely cover aperture 114, but typically less than the dimensions (length and width) of substrate 102.

Paragraph beginning on page 11, line 24, and ending on page 12, line 9:

Substrate 202 has an opening or aperture 214 extending from the top surface of substrate 202 to the bottom surface of substrate 202. A downward facing cavity is formed by securing a support material such as thin sheet material 216 to the top surface of substrate 202 to cover aperture 214. Thin sheet material 216 is typically any type of polyimide or metal foil based or backed material, such as copper or aluminum, on the order of approximately 0.025 to 0.[0]1 mm thick and preferably 0.05 mm thick, and must be able to withstand temperatures involved in typical solder reflow processes without degradation. An adhesive may be used to secure the thin sheet material 216 to substrate 202. The adhesive could be a thermoplastic, thermoset, or pressure sensitive type. The dimensions (length and width) of the thin sheet material 216 are greater than the

dimensions (length and width) of aperture 214 so as to completely cover aperture 214, but typically less than the dimensions (length and width) of substrate 202.